

## UNBC Biomass Gasification System

### About the University of Northern British Columbia Bioenergy Project

Location: Prince George BC

Total Bioenergy Project: \$15.7 million

Energy Cost Savings: \$500,000 per year

Natural Displacement: 80,000 GJ/year (equivalent to the natural gas required to heat 700 homes in BC per year)

GHG Emissions Reduction: 3,500 – 4,000 tonnes per year (equivalent of taking 1,000 cars off the road for a year)

#### Project Overview:

In 2009, UNBC selected Nexterra Systems Corp. to build a biomass gasification that would enable them to utilize wood biomass to displace natural gas used for heating the campus. The new gasification system will reduce UNBC's natural gas consumption by 85%, reduce energy costs by \$500,000 and lower greenhouse gases by 3500 tonnes per year.

#### Local Economic Benefits:

The project used local construction, fabrication, installation and fuel supply including IDL Projects, Northweld Mechanical Installations, Houle Electric, Wainbee and Lakeland Mills. This has resulted in millions of dollars directly and indirectly invested into the northern communities, creating jobs and expertise in bioenergy.

#### Funding Partners:

- \$7.7 million in Federal and Provincial government support through the Knowledge Infrastructure Program
- \$5 million from the BC's Public Sector Energy Conservation Agreement (PSECA)
- \$3.5 million from BC's Innovative Clean Energy (ICE) Fund.

#### Campus Benefits

The UNBC Bioenergy Project was selected as the #1 Campus Sustainability Project in North America by the Association for the Advancement of Sustainability in Higher Education (AASHE).

#### **For more information on the project visit:**

<http://www.nexterra.ca/industry/unbc.cfm>

<http://www.unbc.ca/green/energy.html>

### **What is Biomass and Why Biomass Gasification for Public Institutions?**

Biomass is a low cost, carbon neutral fuel that enables universities and hospitals to self generate heat and power, reduce fuel costs and lower greenhouse gas emissions. The biomass gasification system at UNBC is designed to run on woody biomass including tree trimmings, land clearing debris, clean construction debris, as well as residues from sawmills and value added wood manufacturers.

A key reason for the emerging prominence of bioenergy is that it is a low cost source of renewable energy that is widely available and can provide a continuous supply of thermal

heat or electricity. BC carbon neutral government mandate requires all BC public sector institutions to be carbon neutral by 2010. For public institutions Nexterra's biomass gasification provides a new standard of ultra low air emissions compared to traditional combustion equipment that will not negatively impact local air quality. Nexterra's systems are commercial proven, highly efficient, versatile and reliable and have been adopted by public sector agencies across North America including the US Dept. of Energy, health care centers and other universities such as UBC and the University of South Carolina.

### How the Biomass System Works at UNBC

1. Sawmill residue from Lakeland Mills of Prince George is delivered to the fuel storage area, which can hold up to 60 tonnes of material. In a typical year, the UNBC Bioenergy Plant will consume about 6000 dry tonnes of fuel, equivalent to about 430 truck loads per year (1 – 2 trucks per day).
2. Fuel enters the gasifier and goes through several stages including drying, pyrolysis, (chemical change brought about by heat) and gasification. The wood is converted into a synthetic gas "syngas" which can be used like natural gas.
3. The syngas is conveyed into the oxidizer where it is fully combusted. The resulting hot flue gas is directed through a boiler to produce hot water.
4. Hot water from the boiler is conveyed via an underground piping system and distributed to heat campus buildings. Cool water is circulated back to the boiler where it is re-heated.
5. After exiting the boiler the flue gas is cleaned in an electrostatic precipitator that filters out the particulate matter before being released to the atmosphere. The particulate emissions from the UNBC gasification plant are equivalent to heating systems that burn natural gas.

### UNBC System Configuration

